

What is claimed is:

1. A transistor comprising:

a transparent channel layer using any one of zinc oxide ZnO, zinc magnesium oxide $Mg_xZn_{1-x}O$, zinc cadmium oxide $Cd_xZn_{1-x}O$ and cadmium oxide CdO; and

5 a source, a drain and a gate, in which a transparent conductive material such as conductive ZnO doped or undoped with any one of group III elements, group VII elements, group I elements and group V elements, a transparent conductor such as 10 In_2O_3 , SnO_2 and $(In\cdot Sn)O_x$, or a untransparent electrode material are used partially or entirely.

2. The transistor according to claim 1,

the transistor further comprising:

15 a gate insulating layer using a transparent insulating material such as insulative ZnO doped with elements capable of taking a valence of 1 as a valence number or doped with group V element, a transparent insulating oxide, or a transparent insulator between said transparent channel layer and said gate.

3. The transistor according to claim 1,

20 the transistor further comprising:

a gate insulating layer using a high dielectric transparent insulating material such as $Zn_{1-x}Li_xO$ and $Zn_{1-x}(Li_yMg_{x-y})$ between said transparent channel layer and said gate,

where said gate insulating layer has a memory function.

25 4. The transistor according to any one of claims 1 to 3,

the transistor further comprising:

a transparent insulating substrate on which said transparent channel layer is formed.

5. A semiconductor device, comprising:

30 the transistor according to any one of claims 1 to 4; and

a light emission portion formed of a region continuous to said drain or said source of said transistor or a region of another

semiconductor connected to said drain or said source, and a semiconductor layer jointed to said region.

6. A semiconductor device, comprising:

the transistor according to any one of claims 1 to 4; and

5 a capacitor formed by a region continuous to said drain of said source of said transistor or a region of another semiconductor or a conductor connected said drain and said source, said gate insulating layer or another insulating layer on said region, and a semiconductor layer or a conductive layer on said gate insulating 10 layer or said another insulating layer.

7. A transistor, comprising:

an emitter and a collector, or a base made of a transparent n-type semiconductor such as ZnO doped with group III elements or group VII elements;

15 a base, or an emitter and a collector made of a transparent p-type semiconductor such as ZnO doped with group I elements or group V elements; and

a base electrode, an emitter electrode and a collector electrode, in which a transparent conductive material such as conductive ZnO doped or undoped with any one of group III elements, 20 group VII elements and group I elements, a transparent conductor such as In_2O_3 , SnO_2 and $(In\cdot Sn)O_x$, or an untransparent electrode material are used partially or entirely, the base electrode, the emitter electrode and the collector electrode being respectively 25 formed on said base, said emitter and said collector.

8. A semiconductor device, comprising:

the transistor according to claim 7; and

30 a light emission portion formed of a region continuous to said collector or said emitter of said transistor or a region of another semiconductor connected to said collector or said emitter, and a semiconductor layer jointed to said region.

9. A semiconductor device, comprising:

the transistor according to claim 7, and

5. a capacitor formed of a region continuous to said collector and said emitter of said transistor or a region of another semiconductor or a conductor connected to said collector or said emitter, an insulating layer on said region, and a semiconductor layer or a conductive layer on said insulating layer.

10. A semiconductor device, wherein the transistor according to any one of claims 1 to 4 and 7 is stacked in plural with an insulating layer therebetween, the insulating layer using a transparent insulating material such as insulative ZnO doped with elements capable of taking a valence of one as a valence number or group V elements, a transparent insulating oxide, or a transparent insulator.

11. A semiconductor device, comprising:

15 a plurality of the transistors according to any one of claims 1 to 4 and 7,

wherein a transparent conductive material such as conductive ZnO doped or undoped with group III elements, group VII elements, group I elements and group V elements, a transparent conductor such as In_2O_3 , SnO_2 and $(In\cdot Sn)O_x$, or a untransparent electrode material is used for all of wiring or a part of the wiring between said transistors.

20 12. A semiconductor device, comprising:

the transistor according to any one of claims 1 to 4 and 7;

25 an inductor made of a transparent conductive material such as conductive ZnO doped or undoped with group III elements, group VII elements, group I elements and group V elements, or a transparent conductor such as In_2O_3 , SnO_2 and $(In\cdot Sn)O_x$.

30 13. A semiconductor device, wherein a plurality of the semiconductor devices according to any one of claims 5, 6, 8 and 9 are arranged in a matrix shape, and a capacitor or a light emission portion is driven by each transistor.